



## NASA STTR 2010 Phase I Solicitation

### T5.01 Technologies for In Situ Compositional Analysis and Mapping

Lead Center: JPL

This subtopic is focused on developing and demonstrating technologies for in situ compositional analysis and mapping that can be proposed to future planetary missions, including the Mars 2018 Rover.

Possible areas of interest include:

- Improved sources such as lasers, LEDs, X-ray tubes, etc. for in situ imaging and spectroscopy instruments (including Laser Induced Breakdown Spectroscopy, Raman Spectroscopy, Deep UV Raman and Fluorescence spectroscopy, Hyperspectral Imaging Spectroscopy, and X-ray Fluorescence Spectroscopy);
- Improved detectors for in situ imaging and spectroscopy instruments (e.g. flight-compatible iCCDS and other time-gated detectors that provide gain, robot arm compatible PMT arrays and other detectors requiring high voltage operation, detectors with improved UV and near-to-mid IR performance, near-to-mid IR detectors with reduced cooling requirements);
- Technologies for 1-D and 2-D raster scanning from a robot arm;
- Novel approaches that could help enable in situ organic compound analysis from a robot arm (e.g. ultra-miniaturized Matrix Assisted Laser Desorption-Ionization Mass Spectrometry);
- "Smart software" for evaluating imaging spectroscopy data sets in real-time on a planetary surface to guide rover targeting, sample selection (for missions involving sample return), and science optimization of data returned to earth;
- Other technologies and approaches (e.g. improved cooling methods) that could lead to lower mass, lower power, and/or improved science return from in situ instruments used to study the elemental, chemical, and mineralogical composition of planetary materials.

Projects selected under this subtopic should address at least one of the above areas of interest. Multiple-area proposals are encouraged. Proposers should specifically address:

- The suitability of the technology for flight applications, e.g. mass, power, compatibility with expected shock and vibration loads, radiation environment, interplanetary vacuum, etc.;
- Advantages of the proposed technology compared to the competition;
- Relevance of the technology to NASA's planetary exploration science goals.